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Landform Modeling - Winter 2000 Update

*Taisia Gordon, David Diamond-MoRAP*

Landform features such as plains or mountains reflect the surface shape of a region. Landforms can be used to describe the major enduring features of the landscape, and they are strongly correlated with major patterns in soil and vegetation. Ecoregion polygons such as Land Type Associations are mapped based largely on landform variation. Biogeographer Edwin Hammond developed a system of landform classification based on local relief, slope, and profile. He used USGS 1:250,000 quadrangles to map landforms across the continent.

We can now use GIS to model landforms and landscape position (e.g. ridge top versus back slope) based on analysis of digital elevation models (DEMs). In a pilot study, we used Hammond's original definitions for landform mapping to characterize the enduring features of the Ozark Highlands. This approach allows for quick and easy characterization of landform heterogeneity and variation, which is not possible without GIS-based landform modeling. Relief describes the range of elevation in a local area and is categorized into six elevation ranges:

- 0-30 meters
- 30-90 meters
- 90-150 meters
- 150-300 meters
- 300-900 meters
- >900 meters

Slope is distinguished by the relative amount of land that is gently sloping (less than 8%):

- More than 80% of area gently sloping
- 50-80% of area gently sloping
- 20-50% of area gently sloping
- 0-20% of area gently sloping
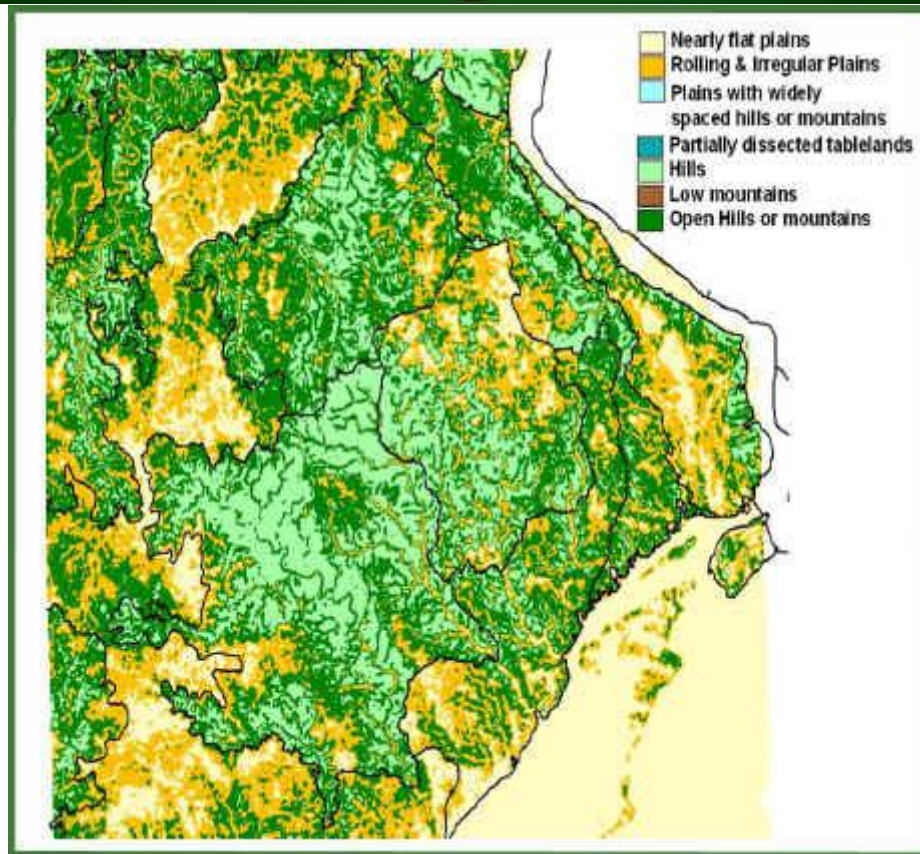
Profile identifies whether an area is higher or lower than the surrounding area.

Forty-eight possible combinations of landscape descriptors result when relief, slope, and profile classes are combined. In order to identify general landform patterns the 48 classes are grouped into coarse-resolution categories,including:

- Nearly flat plains
- Rolling & irregular plains
- Plains with widely spaced hills or mountains
- Partially dissected tablelands
- Hills
- Low mountains
- Open hills or mountains

A consistent, objective description of landforms results from GIS-based modeling. The landforms can then be quantified and analyzed to answer questions such as, what is the distribution of landforms (enduring features) within an ecoregion (or watershed, or county, or ownership)? How well are the enduring features of a given region conserved? What are the major land uses, land covers, and management issues associated with a given landform in a given region?

If you have input or are interested in learning more about landform modeling please contact David Diamond or Taisia Gordon.